CPCCo Central Plateau Cleanup Company

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Administrative Procedure

CPCC-PRO-FP-40421

PRC-PRO-FP-40421

Hot Work

Revision 0, Change 0

Published: 04/26/2021
Effective: 04/26/2021

Program: Fire Protection Engineering
Topic: Fire Protection

Technical Authority: Kraft, Thomas
Alternate Technical Authority: Kujath, Brett
Functional Manager: Kujath, Brett

Use Type: Administrative

- Solid Waste Operations Complex :
  Excluded from USQ
  Exclusion Reason:
  N/A per CPCC-PRO-NS-53097 Table 1
- Canister Storage Building/Interim Storage Area :
  Excluded from USQ
  Exclusion Reason:
  N/A per CPCC-PRO-NS-53097 Table 1
- Central Plateau Surveillance and Maintenance :
  Excluded from USQ
  Exclusion Reason:
  N/A per CPCC-PRO-NS-53097 Table 1
- Waste Encapsulation Storage Facility :
  Excluded from USQ
  Exclusion Reason:
  N/A per CPCC-PRO-NS-53097 Table 1
- 100 K Facility :
  Excluded from USQ
  Exclusion Reason:
  N/A per CPCC-PRO-NS-53097 Table 1
- Plutonium Finishing Plant :
  Excluded from USQ
  Exclusion Reason:
  N/A per CPCC-PRO-NS-53097 Table 1
- 324 Facility :
  Excluded from USQ
  Exclusion Reason:
  N/A per CPCC-PRO-NS-53097 Table 1

JHA: Administrative
Periodic Review Due Date:09/28/2025
Rev. 0, Chg. 0

Change Summary

Description of Change

Update to blue sheet comments:
Update the requirements reference to DOE O 420.1C, Chg 2, Facility Safety. Update DOE-STD-1066-2012 to DOE-STD-1066-2016, Fire Protection. Editorial change consists of updating company terminology (CHPRC to CPCCo) and referenced documents (PRC to CPCC), as well as an update to the current procedure templates, including spell check and updated table of contents. Delete references to SCRD.

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TABLE OF CONTENTS

List of Appendixes

1.0 INTRODUCTION

1.1 Purpose

The purpose of this procedure is to provide for the implementation of hot work requirements.

1.2 Scope

This procedure provides instructions for all hot work performed at Central Plateau Cleanup Company (CPCCo)-controlled facilities or areas including other contractors and subcontractors performing work at CPCCo facilities or areas. This procedure also provides instruction in the safe set-up and use of welding, abrasive grinding, and cutting equipment.

1.3 Applicability

This procedure applies to all hot work performed at CPCCo-controlled facilities and areas. The procedure is applicable to facility personnel, contractors, and subcontractors. This procedure covers the evaluation and permitting process for hot work activities both within the boundaries of a designated hot work area and hot work operations outside of a designated area (field hot work). For the purpose of this procedure, hot work shall include abrasive grinding or cutting operations that liberate sparks, torch soldering or welding operations, arc welding, and any tool operations involving open flames or surface temperatures of greater than 450°F.

1.4 Implementation

This procedure implements the fire prevention requirement for hot work listed in DOE O 420.1C Chg. 2, *Facility Safety*, and uses DOE-STD-1066-2016, *Fire Protection*, and NFPA 51B, *Fire Prevention During Welding, Cutting and Other Hot Work,* as standards for the development of the program.

This procedure is effective upon publication.

2.0 RESPONSIBILITIES

2.1 Facility Manager/Building Manager (FM/BM)

FM/BM or a designated agent shall be responsible for safe hot work activity in their facilities. This includes:

- Responsible for the functional implementation of this procedure.
- Establishes permissible areas for hot work.
- Designates a permit authorizing individual (PAI).
- Ensures other work activities or operations do not pose a conflicting hazard with hot work (e.g., hot work and fire system impairments, hot work and flammable spray applications, etc.).
- Advises all contractors about site-specific flammable materials, hazardous processes or conditions, or other potential fire hazards.

2.2 Field Work Supervisor (FWS)

The Field Work Supervisor (FWS) or a designated agent shall be responsible for ensuring safe hot work activities for both field and designated hot work areas. This includes:

- Ensures craft and supervisors are trained in the safe operation of the equipment, the safe use of the process, and the equipment procedures.
- Designates an individual to be responsible for controlling hot work operations in restricted areas or areas not specifically designed for hot work.
- Ensures only approved apparatus, such as torches, manifolds, regulators or pressure-reducing valves, and acetylene generators are used.
- Ensures all individuals involved in the hot work operations, including contractors, are familiar with the provisions of this procedure.
- Ensures individuals involved in hot work operations are trained in the safe operation of their equipment and in the safe use of the process.
- Ensures individuals involved in hot work operations shall have an awareness of the inherent hazards involved and understand the emergency procedures in the event of a fire.
- FWSs are not to function as PAIs. Instead, the PAI is to coordinate with the FWS to ensure their hot work activities do not conflict with other potentially hazardous operations.
- Ensures all responsibilities listed in Section 2.3 are reviewed with workers and satisfied.

2.3 Hot Work Operator (Craft)

- The individual shall be aware of the hazards involved and familiar with the provisions of this procedure. This includes:
    - Following technical procedures, work package directions and associated permit directions.
    - Examining all equipment prior to use to ensure it is in a safe operating condition.
    - Removing any unsafe equipment from service and report it to operations for repair or replacement.
    - When identified by the Hot Work Operator, ceasing hot work operations if unsafe conditions develop and notifying Field Work Supervisor (FWS) and Operations immediately.

2.4 Permit Authorizing Individual (PAI)

NOTE: *At facilities, the Shift Manager is the position performing the PAI role. At small work sites outside of areas controlled by a facility, such as a well pad, the PAI could be the supervisor of the FWS.*

The PAI in conjunction with the FM/BM and FWS shall be responsible for safe field hot work activities by ensuring that other work activities or operations do not pose a conflicting hazard with hot work. This includes, but is not limited to, the following:

- Coordinates work packages and other Hanford Fire Marshal (HFM) Permit activities (e.g., fire system impairments, flammable liquids operations, etc.)
- Provides approval to workers before the start of hot work operations.
- Coordinates with the FWS to ensure their hot work activities do not conflict with other potentially hazardous operations. FWS are not to function as PAIs.

2.5 Cognizant Industrial Hygienist

- When reviewing and considering precautions for hot work, consider the safety of the hot work operator and fire watch with respect to personal protective equipment (PPE) for other special hazards beyond hot work. The CPCCo Industrial Hygienist is responsible for the evaluation of industrial hygiene hazards and associated selection of PPE for hot work activities. The Field Hot Work Permit is intended to ensure that an Industrial Hygiene Exposure Assessment is performed. To do this, Safety Data Sheets (SDS) of the welding rods, fluxes, base metals, and other products to be used must accompany the Field Hot Work Permit to ensure an accurate review.

2.6 Cognizant Fire Protection Engineer (FPE) and Field Work Supervisor (FWS) or Work Planner

Cognizant FPE and FWS or Work Planner, when reviewing and considering precautions for hot work shall:

- Determine site-specific flammable materials, hazardous processes, or other potential fire hazards that are present or likely to be present in the work location.
- A combustible is a material that, in the form in which it is used and under the conditions anticipated, will ignite and burn. Ensure protection of combustibles from ignition by the following means:
    1. Considering alternative methods to hot work
    2. Moving the work to a location that is free from combustibles
    3. If the work cannot be relocated, moving the combustibles to a safe distance or having the combustibles properly shielded against ignition
    4. Scheduling hot work so that operations that could expose combustibles to ignition are not begun during hot work operations

If (2) through (4) cannot be met, hot work shall not be performed.

- Determine that fire protection and extinguishing equipment is properly located at the site.
- Where a fire watch is required, ensure a fire watch is at the site.

2.7 Fire Watch

NOTE: *It is important to distinguish the differences between "Fire Monitoring" and "Fire Watch," as NFPA 51B makes it clear that they are the not the same thing. Fire monitoring is provided following the completion of the established fire watch, as determined by the PAI. The provision of additional hot work area monitoring should be determined based on the conditions that will support hidden, smoldering fire conditions such as combustible construction, storage of bulk materials such as baled wastepaper or piled trash, or concealed spaces within building construction.*

A fire watch shall be required for all hot work outside of designated hot work areas and when required by the cognizant FPE inside designated hot work areas. Requirements and duties include:

- Must stay alert at all times for the possibility of a fire, and maintain particular vigilance to elevations beneath the work area.
- Performs only fire watch duties when assigned to the task. Assignment to areas during welding/cutting/burning when combustible material cannot be removed from the area and/or the possibilities of fire exist.
- Remains on site for a minimum of **60** minutes after all hot work has ended to ensure there are no latent fire hazards.
- For torch-applied roofing operations, be posted for at least **120** minutes following completion of the operation and perform an additional 120 minutes of fire monitoring.
- Be provided with a fully charged and operable fire extinguisher at the worksite throughout the entire job. Ensures a separate extinguisher is brought to the worksite.
- Fire extinguisher shall be provided by the project.
- Does not take a mounted extinguisher in the facility from its storage rack, except in case of fire. Wall-mounted fire equipment is for emergency use only.

Additional responsibilities associated with this procedure are identified in the process steps.

3.0 PROCESS

3.1 Hot Work Performed Outside of Designated Hot Work Areas (requires a Field Hot Work Permit)

Field Hot Work Area: An area where "hot work" will be performed that generally meets the following criteria:

- *Is not a designated hot work area*
- *An area where a "one-time" hot work evolution will occur*
- *An area that is not within a defined space that has a well-established boundary*
- *An area where hot work will occur, but where hot work does not occur on a routine basis*
- *An area where specific hot work criteria need to be applied to ensure a safe work environment that might not meet those criteria on a routine basis*

Since hot work located outside of a designated hot work area is by its nature a potential injury or ignition source to surrounding personnel and operations, particular care must be taken to ensure both the hot work and its effects are isolated. The permit associated with this process provides a method for tracking hot work activities in an effort to ensure they are properly monitored, secured, and that no potentially hazardous conflicting operations are permitted in the immediate area. Use of a Field Hot Work Permit is a requirement of NFPA 51B and procedure implemented through this.

A Field Hot Work Permit shall be completed for each hot work operation (i.e., abrasive grinding or cutting operations which liberate sparks, torch soldering or welding operations, arc welding, or any tool operations involving open flames or surface temperatures of greater than 450°F) prior to the actual work. In the case of contractor/vendor hot work operations, these shall be subject to the same evaluation and permitting as those conducted by CPCCo staff.

Hot work that is performed at locations other than in a designated hot work area shall require an approved *Field Hot Work Permit* (Site Form A-6006-115) before each job. The following are low risk activities that are typically exempted from hot work controls:

- Sanding using grinders with sanding discs
- Dremel tool grinding
- Pedestal or bench mounted grinders
- Pedestal or bench mounted sanders
- Rotary files
- Reciprocating saws
- Band saws
- Nibblers
- Electric soldering

Cognizant FPE approval shall be required on all Field Hot Work Permits.

A fire watch shall be established before starting hot work.

The work area shall be inspected to ensure compliance with the following:

- The job relocated to avoid exposing combustibles to ignition sources due to the hot work, if possible.
- Combustibles moved at least 35 ft. away from the work or protected by Factory Mutual Global (FM Global) approved welding curtains, blankets, or if appropriate, the combustible materials may be wetted.
- Shut down ducts that might carry sparks to distant combustibles.
- All openings or cracks in walls, floors, systems, and equipment within 35 ft. of the work shall be covered or plugged to prevent sparks from reaching adjacent areas.
- Hot work to be performed near walls, partitions, ceilings, or roofs of combustible construction shall be provided with FM Global-approved welding curtains or guards to prevent ignition.
- If hot work is to be performed on a wall, partition, ceiling, or roof, precautions shall be taken to prevent ignition of combustibles on the opposite side by relocating combustibles. If it is impractical to relocate combustibles, a fire watch on the opposite side from the work shall be provided.
- Every elevated hot work operation shall be evaluated on a case-by-case basis by the cognizant FPE to determine a reasonable safe distance from hot work to combustible occupancies or construction. For elevated hot work, combustible materials should be either relocated a minimum of 50 ft. from the hot work area; or properly protected with FM Global-approved welding blankets; or the hot work operation isolated with FM Global-approved welding curtains. Suspend fire-resistive welding blankets under hot work conducted near the ceiling. Place FM Global-approved welding curtains around hot work at the floor to trap sparks. The physical conditions involved may dictate relocation of combustibles beyond 50 ft.
- Welding shall not be performed on metal partitions, walls, ceilings, or roofs with combustible coverings or with combustible sandwich-type panel construction.
- When hot work is performed on pipes or other metal objects that are, or have been, in contact with combustible materials or flammable materials such as flammable liquids, the configuration shall be evaluated by the cognizant FPE to ensure heat conduction through the metal does not present the threat of ignition.
- Hot work areas requiring scaffolding for access shall be constructed of metal planks or shall be approved by the cognizant FPE.
- If installed, automatic fire suppression systems shall be operable unless concurrence is obtained from the cognizant FPE.
    - Special precautions need to be taken to avoid accidental activation of automatic fire protection systems. Consult with the cognizant FPE for appropriate special precautions to avoid inadvertent activation of fire protection systems.

NOTE: *Depending on the operation, detectors may need to be covered or removed.*

- If installed, the Hanford Fire Department (HFD) shall bypass or protect smoke/heat detectors that may be affected by the work, before the hot work begins (and restored to service as soon as possible after the job). **This action will require completion of a HFM permit for a planned impairment.**
- From a fire protection perspective, before initiating hot work in spaces classified as confined spaces as defined in DOE-0360, *Hanford Site Confined Space Procedure (HSCSP)*, the cognizant FPE shall evaluate the hazard based on NFPA 326, *Standard for Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair.* Other industrial hygiene and safety precautions pertaining to confined spaces shall be applied in accordance with established CPCCo safety procedures with the assistance of a qualified safety and/or industrial hygiene professional.
- Prior to hot work on small tanks, containers, or piping, the FPE shall evaluate the hazard based on NFPA 326.

NOTE: *The following process steps may be performed in any order as needed to conduct work safely.*

Actionee	*Step*	*Action*
Responsible Manager/ FWS/PAI	1.	ENSURE hot work is identified during work planning.
	2.	ENSURE compliance with hot work requirements in accordance with CPCC-PRO-WKM-079, *Job Hazard Analysis.*
	3.	COMPLETE the Field Hot Work Permit.
	4.	CONDUCT physical review of the proposed hot work area to determine necessary precautions and identify potential hazards to hot work workers, surrounding personnel, fire hazards, combustible or flammable materials in the area, and equipment that may need further protection or isolation.
	5.	REVIEW the proposed work with the PAI to coordinate activities, IDENTIFY further precautions, AND ARRANGE for safe arrangement of the Fire Watch.
	6.	SCHEDULE the cognizant FPE review and approval at least 24 hours in advance for new projects.
Cognizant FPE	7.	REVIEW Field Hot Work Permit.
	8.	Physically REVIEW the proposed hot work area with the FWS. (If the FPE determines that adequate feedback is provided to confirm that the work site is compliant with the limitations of the Field Hot Work Permit, they may consider waiving the individual site inspection.)

Actionee	*Step*	*Action*
Cognizant FPE	9.	IDENTIFY other potential or fire hazards to the hot work FWS AND RECOMMEND corrective action.
	10.	ENSURE specific additional controls, if identified, are documented in the Field Hot Work Permit form.
	11.	APPROVE the Field Hot Work Permit.
IH	12.	REVIEW the Field Hot Work Permit.
	13.	COMPLETE Special Industrial Hygiene Instructions/Remarks section of the permit.
	14.	APPROVE the Field Hot Work Permit.
USQ	15.	REVIEW the Field Hot Work Permit.
	16.	DETERMINE if a USQ Screening / USQD is required.
	17.	APPROVE Field Hot Work Permit.
FWS	18.	COORDINATE the relocation, covering, or other protection of equipment and material within the proposed hot work area.
	19.	COORDINATE the designation of qualified Fire Watch for the area.
	20.	COORDINATE safe relocation of personnel from the proposed hot work area and personnel traffic control throughout the permit operation.
PAI	21.	REVIEW precautions and safety equipment selections of the Field Hot Work Permit with the FWS.
	22.	REVIEW coordination of the proposed hot work to prevent conflicts with other work activities that may increase fire or personnel hazards.
	23.	RETAIN one copy of the completed Field Hot Work Permit throughout the duration of the hot work task.
FWS	24.	Physically REVIEW AND ENSURE all physical barriers, weld curtains, ventilation, and/or warning signs are posted for the work area.
	25.	SIGN the Field Hot Work Permit AND RETAIN one copy throughout the duration of the hot work task.
PAI	26.	Physically REVIEW AND ENSURE all relocation, covering, or other protection of equipment and storage within the proposed hot work area has been completed.

Actionee	*Step*	*Action*
FWS	27.	REVIEW the Field Hot Work Permit precautions and task package with the Hot Work Operator and the Fire Watch.
	28.	VERIFY that hot work equipment is in safe working order.
	29.	VERIFY that personnel have received current safety training for the task.
	30.	VERIFY that PPE and fire extinguishers required for the job have been obtained.
Hot Work Operator	31.	REVIEW the Field Hot Work Permit precautions and task package with the FWS.
	32.	CONFIRM that hot work equipment is in safe working order.
	33.	CONFIRM that PPE and fire extinguishers required for the job have been obtained.
	34.	CONFIRM that the work area conforms to the Field Hot Work Permit precautions by physical review.
	35.	INFORM the Fire Watch, FWS, and PAI or Qualified Foreperson at any time work is to be initiated, temporarily suspended, re-initiated, or terminated.

NOTE: *For hot work that extends beyond one shift, the oncoming supervisor, fire watch, and worker for each shift must sign and date the field hot work permit log sheet.*

	36.	IF hot work is to extend beyond one shift or will carry over between shifts, THEN UPDATE the FWS and PAI at the change in shift.
PAI	37.	IF hot work is extended beyond one shift, THEN REVIEW the hot work location(s), ENSURE it complies with the requirements listed in the hot work permit, AND SIGN AND DATE the field hot work permit log sheet.
Hot Work Operator	38.	IF the duration of hot work is likely to exceed the estimated duration, THEN UPDATE the cognizant FPE and PAI AND REVIEW precautions.
	39.	IF hot work operator(s) is to change during the permit term, THEN CONDUCT a briefing period between hot work workers to review precautions, the permit controls, and work progress.

Actionee	*Step*	*Action*
Fire Watch	40.	REMAIN in the designated hot work area or assigned segment throughout the duration of the hot work, plus 60 minutes thereafter, unless released by another qualified fire watch person.
	41.	IF work is to be temporarily suspended for greater than 60 minutes, THEN COMPLETE a thorough review of the area for potential fires and to control personnel traffic for at least 60 minutes beyond the time of hot work suspension.
	42.	During hot work activities, CONDUCT a thorough review of the area for potential fires AND CONTROL personnel traffic.
	43.	ENSURE personnel protective barriers and warning signs are maintained throughout the duration of the work.
	44.	IF Fire Watch(es) is to change during the permit term, THEN CONDUCT a briefing period between Fire Watches to review precautions, the permit controls, and work progress.
	45.	WHEN the hot work is completed, THEN COMPLETE a thorough review of the area for potential fires and to control personnel traffic for at least 60 minutes beyond the time of hot work termination.
	46.	ENSURE the final fire watch section of the Field Hot Work Permit is completed and signed, the FWS notified, and the area copy returned to the hot work PAI.

3.2 In the Event of Fire or Personnel Injury

NOTE: *The following process steps may be performed in any order as needed to conduct work safely.*

Actionee	*Step*	*Action*

NOTE: *Whoever identifies the fire first shall notify other hot work personnel in the area.*

Hot Work Operator or Fire Watch

1. IF a fire or smoke is seen or smelled,
   THEN PROVIDE a verbal local alarm. Personally NOTIFY the Area Supervisor, if feasible, for the safety of others involved. If not feasible, area personnel should be notified and requested to raise the general evacuation alarm for the area.

2. Immediately PROCEED to the nearest safe exit unless an attempt is made to extinguish the fire.

NOTE: *You do not have to fight a fire, but you must immediately report a fire before making any attempt to extinguish it (no matter how small the fire.)*

3. IF the fire is in the incipient stage and the choice is made to attempt to extinguish the fire,
   THEN COMPLY with the following:

   a. NOTIFY HFD before attempting any fire extinguishment activity.

   b. ENSURE a safe, clear escape route is visible and remains so throughout the attempt to use the extinguisher.

   c. ENSURE the type of material (A-B-C-D) burning is known to determine if the correct extinguisher is available.

   d. CONSIDER the following before attempting to use extinguisher:

      - Location and rate of fire growth
      - Potential for smoke generation
      - Area is a potentially toxic atmosphere
      - Obscuration of the escape path

Actionee	*Step*	*Action*
Hot Work Operator or Fire Watch		e. IF the individual still considers that the fire is at a sufficiently small stage and can reasonably be suppressed, THEN USE ONLY ONE fire extinguisher in the attempt. 1) IF this ONE attempt fails, THEN immediately EXIT the area by the safest route available. 2) ONLY if safe to do so, CLOSE the doors or windows in the room of the fire AND SHUT OFF fire-involved equipment as you are exiting the area. 4. Immediately NOTIFY HFD to respond by pulling a fire alarm system manual pull station (located adjacent to the building exits), or by pushing the button on the front of the Radio Fire Alarm Reporter (RFAR), or by a phone call to 911 (cell phone (509) 373-0911). A RFAR is a red box located on the outside of a building. a. IF notification is by phone, THEN PROVIDE detailed information as requested by HFD. 5. IF the building has an active Fire Alarm System in service, THEN PULL the manual pull station at the exit. a. IF there is no manual pull station, THEN EXIT the building AND PUSH the button on the front of the RFAR unit. 6. REPORT to the facility staging area for accountability. DO NOT RE-ENTER the building. 7. FOLLOW UP the fire alarm system activation with a phone call from the staging area providing HFD with requested information, if initial notification to HFD was via manual pull station or RFAR activation.

3.3 Hot Work Performed in Designated Hot Work Areas (requires an HFM Permit)

This section describes the evaluation, approval, and permitting process required to classify an area as a Designated Hot Work Area.

> ***Designated Hot Work Area**: A permanent FPE-approved and Hanford Fire Marshal permitted location for hot work operations. Designated hot work areas shall meet the following criteria:*
>
> - *A fixed area that has well defined boundaries and is suitably segregated from adjacent areas*
> - *An area where repetitive hot work will occur; e.g., welding area*
> - *An area that has been set up to accommodate hot work; i.e., is free of combustible materials*
> - *Permit shall be posted designating hot work areas*

A HFM Permit issued by a Deputy Fire Marshal (DFM) shall be required to authorize an area as a designated hot work area. The HFM Permit demonstrates that the area has been reviewed by a DFM to ensure it qualifies for a designated hot work area and establishes any applicable controls. The FWS and cognizant FM/BM are responsible to ensure the area is maintained in accordance with the requirements in this document and the HFM Permit.

A review of the designated hot work area and HFM Permit shall be conducted by the cognizant DFM at least annually or as part of Facility Fire Protection Assessments (FFPA), whichever comes first. For existing designated hot work areas, criteria that would require a new or revised HFM permit, could include facility modifications, change in locations, and changes the type of hot work performed or hot work equipment used.

CPCC-PRO-FP-40422, *Fire Marshal Permit Interface*, specifies the content required to be addressed in HFM permits for designated hot work areas.

A Job Hazards Analysis (JHA) shall be completed for hot work activities, when applicable, in accordance with CPCC-PRO-WKM-079. When changes occur in the field that could impact the validity of the JHA, the JHA shall be reviewed (if necessary) and updated as required to reflect the field changes.

- The Job Supervisor shall schedule the cognizant Industrial Hygiene or Safety Professional review and approval of the JHA at least 24 hours in advance for new projects.
- Those performing hot work shall wear FR PPE to at least the level determined through the JHA process to protect the worker from the effects of heat, sparks, and flame, unless approval to deviate is given on a case-by-case basis by the cognizant Industrial Hygiene or Safety Professional (e.g., FR coveralls, leathers are acceptable in non-radiological areas, or FR/leather full front apron as a minimum for “low hazard” hot work).

NOTE: *Red flame retardant (FR) coveralls (including hoods and boots) for use in radiological areas and brown FR coveralls for use in non-radiological areas are available through the Hanford Central Warehouse.*

- The FR PPE requirement shall not be waived in a designated hot work area if a designated fire watch is not provided.
- All hot work in areas governed by a radiological work permit (RWP) shall require the use of fire retardant PPE. If the RWP requires a double set of anti-contamination coveralls, the outer set of coveralls shall be flame retardant.
- Special circumstances pertaining to PPE/fire watch requirements. (Example: Establishing a fire watch in lieu of PPE requirements or vice versa for specific hot work operations.) This analysis should be conducted by a qualified industrial hygienist.
- The area shall be provided with a fully charged and serviced portable fire extinguisher (minimum 2A-10BC rating) that serves only the designated hot work area.
- The area shall have adequate ventilation (consult CPCCo Industrial Hygiene). Inside buildings, the designated hot work area shall be provided with visual protection, i.e., surrounded by a booth. FM Global-approved welding curtains or if greater than 35 ft. away with visual protection screens meeting NFPA 701, Test 2.
- When the designated hot work area is bounded by other than noncombustible fixed partitions, portable hot work partitions consisting of welding curtains shall be arranged in the following manner:
    - Hot work partition panel materials shall be tested and approved in accordance with ANSI/FM 4950, *American National Standard for Evaluating Welding Pads, Welding Blankets and Welding Curtains for Hot Work Operations*.
    - Hot work partitions shall be arranged on all open sides of the hot work and extend at least 4 ft. above the horizontal plane of the hot work, or as reviewed and approved in advance by the DFM.
    - Hot work partitions panels shall be arranged, overlapped, and secured to prevent gaps from which sparks or embers may pass and to prevent toppling. (Provide at least a 6 in. overlap at the sides and at the bottom.)
    - Any gaps at the base or sides of hot work partitions shall be covered with FM Global-approved welding blanket or curtain materials or other secured noncombustible or fire resistive materials.
    - Maintain a minimum 3 ft. clear space free of combustible material on the non-working side of the hot work partition. Alternatively, enclosed metal cabinets and/or job boxes may be used for the storage of combustible, if reviewed and approved in advance by the FPE/DFM. Flammable liquids or combustible liquids storage in open shelving or in approved flammable liquids storage cabinets is not permitted within 10 ft. of the hot work partition.

Actionee	*Step*	*Action*
Responsible Manager	1.	IDENTIFY areas requiring an HFM Designated Hot Work Area Permit.
	2.	OBTAIN an HFM Designated Hot Work Area Permit in accordance with CPCC-PRO-FP-40422, *Fire Marshal Permit Interfaces*.
		a. IF current HFM Designated Hot Work Area Permit already exists for required hot work, THEN GO TO step 4.
DFM	3.	ISSUED HFM Designated Hot Work Area Permit shall be for no more than 1 year.
Hot Work Operator	4.	PERFORM hot work in accordance with the requirements of the posted HFM Designated Hot Work Area Permit.
DFM	5.	Annually REVIEW AND RENEW the HFM Designated Hot Work Area Permit.

3.4 Non-Permissible Areas

Most low risk activity tools/operation typically are exempted from hot work controls (see Section 3.1). However, these may require special consideration prior to use in the following types of locations.

All other hot work shall not be permitted in the following areas:

- In areas not authorized by management
- In buildings where fire protection systems are impaired, unless additional precautions are taken as determined by the DFM
- In the presence of explosive atmospheres (i.e., where mixtures of flammable gases, vapors, liquids, or dusts suspended in air exist)
- In the presence of uncleaned or improperly prepared equipment, drums, tanks, or other containers that have previously contained materials that could develop explosive atmospheres
- In areas with potential fire or flash fire hazards associated with the presence of one or more combustible particulate solids (dusts)

3.5 Setup and Use of Welding and Cutting Equipment

3.5.1 Operating Requirements

- The use, storage, and maintenance of gas cylinders shall be in accordance with CPCC-STD-FP-54135, *Control of Compressed and Flammable Gases.*
- All oxy-fuel and electric welding and cutting equipment shall be kept in good working condition. If found by pre-work inspection or general usage to be defective (incapable of reliable safe operation), it shall be promptly withdrawn from service.
- All equipment shall be operated in accordance with manufacturer's recommendations and instructions.
- All compressed gas cylinders shall be properly labeled with the type of gas used including the hazard identification information.
- Oxygen shall be called by its proper name "oxygen," not by the word "air."
- Fuel gases shall be called by their proper names such as: acetylene, propane, MAPP, natural gas, and not by the word "gas."

3.5.2 Equipment Details

Hot work equipment (torches, regulators, pressure-reducing valves, and manifolds, etc.) shall be listed or approved by a nationally recognized testing lab (NRTL) for the intended use.

Personally owned equipment shall not be used without the express written approval of the facility supervision.

Oxygen-fuel gas systems (e.g., oxygen/acetylene welding) shall be equipped with listed and/or approved backflow valves, flash arrestors, and pressure-relief devices.

Hot work curtains, blankets, and pads shall be listed or approved by UL, Factory Mutual (FM), or other NRTL when tested in accordance with ANSI/FM 4950. The manufacturer of curtain, blanket, and pad materials shall prominently label their products so that they contain the NRTL agency name and performance rating (i.e., "Curtain," "Blanket," "Pad") on the packaging and along the entire length of material on each roll.

Hot work areas requiring scaffolding for access shall be constructed of metal planks or shall be approved by the cognizant FPE.

1. Cylinders and Equipment

    a. General Cylinder Provisions

        i. All portable cylinders used for storage and shipment of oxygen, fuel, and welding gases shall be constructed and maintained in accordance with regulations of the U.S. Department of Transportation (DOT). Such compliance shall be recognized by markings on the cylinder, usually on the top shoulder with the applicable DOT specs.

        ii. No one except the owner of the cylinder or persons authorized by the owner shall fill a cylinder.

iii. No person other than the gas supplier shall mix gases in a cylinder or trans-fill gases from one cylinder to another. (American National Standards Institute/American Welding Society [ANSI/AWS] Z49.1-88, *Safety in Welding, Cutting, and Allied Processes*)

iv. Compressed gas cylinders shall be legibly marked with either the chemicals or trade name of the gas in conformance with the method for marking portable compressed gas containers to identify the material contained. Do not use containers on which the labeling is missing or illegible. If unable to identify contents, cylinder shall be returned to supplier.

2. Cylinder Storage and Handling

a. Cylinders shall be stored where they shall not be exposed to physical damage, tampering by unauthorized persons, or subject to temperatures, which would raise the contents above 130°F (54°C).

b. Cylinders shall be stored away from elevators, stairs, or gangways in assigned places where cylinders shall not be knocked over or damaged by passing or falling objects. Cylinders shall be secured in storage to prevent falling.

c. Cylinders in storage shall be separated from flammable and combustible liquids, and from easily ignited materials such as wood, paper, packaging materials, oil, and grease by at least 25 ft. (6.1m) or by a noncombustible barrier at least 5 ft. high (1.6 m) having a fire resistance of one-half hour.

d. Oxygen cylinders in storage shall additionally be separated from fuel gas cylinders.

e. Up to 6000 scf (600 lb) of oxygen may be stored outside provided segregation requirements from combustible and flammable gases are met. (NFPA 400, *Hazardous Materials Code*, Table 5.4.1.2)

f. Up to 3000 scf (300 lb) of fuel gas cylinders may be stored outside provided segregation requirements from combustible and oxidizing gases are met. (NFPA 400, Table 5.4.1.2)

g. Quantities of flammable gases and for oxygen in excess of the permit threshold limit of NFPA 400 (see CPCC-PRO-FP-40422, Appendix C) shall be reviewed and approved by the cognizant FPE. Quantities of flammable gases, oxygen, and other substances subject to the permit threshold limits in CPCC-PRO-FP-40422 require an approved HFM permit when quantities exceed the permit threshold limit.

h. Containers in storage areas at user’s facilities shall be prominently posted with the name of the gases to be stored. Full and empty cylinders shall be marked and separated.

i. Containers may be stored in the open but shall be protected from standing in water to prevent bottom corrosion. Containers should be placed on raised platforms to prevent this condition.

j. While in storage, compressed gas cylinders' valve protection caps shall be in place and secured.

k. No cylinder shall be left free-standing. All cylinders shall be secured in place at all times.

l. When transporting, moving, or while standing-by inside the plant or other areas, compressed gas cylinder valve protection caps shall be in place and secured.

m. A suitable cylinder truck, chain, or other steadying device shall be used to keep cylinders from being knocked over while in use or in storage.

n. When work is finished, the cylinder valve shall be closed and valve protection caps installed.

o. Cylinders shall be kept far enough away from the actual welding or cutting operation so that sparks, hot slag, or flame shall not reach them.

p. Cylinders containing oxygen or acetylene or other fuel gases shall not be taken into confined spaces.

q. No damaged or defective cylinder shall be used.

r. When cylinders are to be moved with regulators attached, the cylinders shall be secured in position and the cylinder valve closed.

s. Nothing shall be placed on top of a cylinder when in use that may damage the safety device or interfere with the quick closing of the shutoff valve.

t. Cylinder valves shall be closed when work is completed, or at the end of the work period.

3. Hoses

a. Hose colors shall be red for fuel, green for oxygen, and black for inert gas and air.

b. Hoses used for oxygen fuel gas welding and allied operations shall be specifically manufactured to meet American Welding Society standards for utility and safety.

c. Hoses for oxy-fuel gas service shall comply with Specification IP 7 for rubber welding hose, Compressed Gas Association, and Rubber Manufacturers Association.

d. Reverse-flow check valves and flashback arrestors compatible with the make and model of the torch shall be provided for all portable oxygen-fuel units. (Many flashback arrestors also contain reverse flow check valves within the same unit.)

e. At a minimum, reverse-flow check valves and flashback arrestors shall either be built into the torch handle or be installed at the torch inlet to protect both the hose and cylinder upstream.

f. If flashback arrestors are provided at the regulator, they must be specifically designed for low-flow restriction and oxygen-acetylene unit adjusted for the specific flow and pressure requirements for the torch tips used, and operating personnel trained in their limitations and associated operating requirements.

g. Any box, container, or other device used for the storage of gas hoses shall be ventilated.

h. Hoses shall be visually inspected prior to and at the end of hot work activities to identify defects in the condition of hose jackets and fitting.

i. Damaged hoses shall be immediately removed from service.

j. Hoses showing leaks, burns, worn places, or other defects rendering it unfit for service shall be repaired or replaced.

k. If hoses are to be taped together to avoid tangling, no more than 4 in. in 12 in. shall be covered.

l. Hoses shall not be wrapped around the neck of compressed gas cylinders, as this may interfere with the quick closing of the shutoff valve in an emergency.

m. Hose connections shall comply with CGA pamphlet E 1, *Standard Connections for Weld/Cut Equipment*.

4. Regulators and Gauges

a. Only approved pressure-reducing regulators, as defined in ANSI Z-49.1 1983-Z.3, shall be used.

b. Pressure reducing regulators shall be used only for the gas and pressure for which they are labeled.

c. Regulators shall not be inter-changed among designated gas devices.

d. Union nuts and connections should be inspected before used.

e. Gauges used for oxygen shall be marked "Use No Oil."

f. Regulators shall be drained before attaching to a cylinder. The outlet connection should be wiped clean and the cylinder valve shall be briefly cracked open before attaching regulator.

g. The oxygen cylinder valve shall always be opened slowly. If high-pressure oxygen is suddenly applied, it is possible to cause ignition in the regulator and injure the operator.

h. When regulators or parts of regulators need repair, the work shall be performed by a qualified, reputable outside agency. Gauges may be changed by a trained individual, qualified by the supervisor to perform this.

i. The cylinder valve shall always be opened slowly to prevent damage to regulators. For quick closing, valves on fuel gas cylinders shall not be opened more than 3/4 turns. When a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use so that fuel gas flow can be shut off quickly in case of emergency.

5. Control of Cutting and Welding Areas

    a. The Operations and Maintenance managers shall establish work areas for the three (3) categories of cutting and welding. These categories are:

        1) Unlimited welding and cutting areas. These areas must have minimal flammable materials present, floors, etc., such as a weld shop.

        2) Permission area. These areas must have minimal flammable materials available, but shall require protection for passersby or personnel working on floors or scaffolds below the site of welding or burning. Fire watch and/or fire protection equipment is required.

        3) Confined Spaces. Minimal cutting or welding permitted. Forced ventilation, fire watch, and atmosphere monitoring is required.

6. Equipment Housekeeping

    a. Good housekeeping shall be maintained at all times. All hoses and cables shall be placed so that they do not present a hazard to personnel in the general work area, in passageways, stairs, ladders, grating, and other areas where work may be performed. Hoses are to be placed in an elevated overhead position whenever possible. This shall minimize tripping hazards as well as limit hot slag, sparks, etc., from falling on and burning into the hoses and cables. Do not hang hoses with wire.

7. Ventilation

    a. Adequate ventilation (natural, mechanical) shall be provided.

    b. Welders and cutters shall take precautions to avoid breathing the fume plume directly. This is done by positioning the head or the work away from the plume, or by ventilation (natural or mechanical). This directs the plume away from the face.

8. Fire Prevention and Protection

    a. It is the responsibility of all welding/cutting operators, supervisors, and outside contractors to use precautions in the prevention of fires.

    b. Welding and cutting should preferably be done in designated hot work areas, which minimize fire risk.

9. Pressure/Flow (PF) Device (Reverse Flow Check Valve and Flashback Arrestor)

    a. A PF device shall be required on all welding and cutting hose assemblies at the site.

    b. A PF device or assembly of devices in a fuel gas line designed to perform the following functions:

        i. Prevent backflow of oxygen into the fuel gas supply system.

        ii. Prevent the passage of flame into the fuel gas supply system (flashback).

iii. Prevent the development of a fuel gas-oxygen mixture at sufficient pressure so that its ignition would achieve combustion pressure that could cause failure to perform functions i and ii.

10. Torches

a. Only those torches and related equipment approved by the facility using ANSI Z-49.1 1983 safety in welding and cutting as guidelines shall be used.

b. The operator shall inspect torches at the beginning of each working shift. Inspect for leaking shutoff valves, hose couplings, and tip connections. Defective torches shall not be used.

c. Torches shall only be lighted by devices designed for that purpose. Do not use cigarette lighters, matches, or molten slag from hot work to light torches.

d. Clogged torch tip openings shall be cleaned as needed with suitable cleaning wires, drills, or other devices designed for such purpose.

e. Torches shall be removed immediately from confined space when work is completed.

f. Before lighting the torch for the first time each day, hoses shall be purged individually to remove flammable mixture from the hoses.

11. Oxygen Use Precautions

a. Oxygen will not burn, but vigorously supports and accelerates combustion causing flammable materials to burn with great intensity. Oil or grease in the presence of oxygen may ignite spontaneously and burn violently. Oxygen cylinders, cylinder valves, couplings, regulators, hoses, and apparatus shall be kept free of oil and grease substances. Operators shall not handle equipment with oily hands or gloves.

b. Oxygen shall not be used as a substitute for compressed air. It shall not be used in pneumatic tools, to blow out pipelines, to dust off clothing, or to create ventilation for an operator at work, and it must not strike oily or greasy surfaces or clothing.

12. Facility has adopted AWS C4.2-78, *Operator's Manual for Oxygen Gas Cutting Textbook Solutions*, as the guideline for setup and operation of oxy-fuel welding and cutting equipment.

4.0 FORMS

Field Hot Work Permit, A-6006-115

5.0 RECORD IDENTIFICATION

All records are generated, processed, and maintained in accordance with CPCC-PRO-IRM-10588, *Records Management Processes*.

Records Capture Table

Name of Record	Submittal Responsibility	Retention Responsibility
Field Hot Work Permit, A-6006-115	Requesting Organization	Requesting Organization
Hanford Fire Marshal Permit (for designated hot work areas)	Requesting Organization	Fire Marshal's Office

6.0 SOURCES

6.1 Requirements

10 CFR 851, *Worker Safety and Health Program*
CPCC-PRO-FP-40422, *Fire Marshal Permit Interfaces*
CPCC-PRO-WKM-079, *Job Hazard Analysis*
CPCC-STD-FP-40404, *Fire Protection Program*
CPCC-STD-FP-54135, *Control of Compressed and Flammable Gases*DOE-0360, *Hanford Site Confined Space Procedure (HSCSP)*
DOE O 420.1C, Chg. 2, *Facility Safety*
DOE-STD-1066-2016, *Fire Protection*
NFPA 1, *Fire Code*
NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*
NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*
NFPA 326, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair*
NFPA 400, *Hazardous Materials Code*

6.2 References

ANSI/AWS Z49.1-88, *Safety in Welding, Cutting, and Allied Processes*
ANSI/FM 4950, *American National Standard for Evaluating Welding Pads, Welding Blankets and Welding Curtains for Hot Work Operations*
AWS C4.2-78, *Operator's Manual for Oxygen Gas Cutting Textbook Solutions*
CGA pamphlet E-1, *Standard Connections for Weld/Cut Equipment*
CPCC-PRO-IRM-10588, *Records Management Processes*

6.3 Bases

CGA pamphlet P-1-1965, *Safe Handling of Compressed Gases*
CPCC-PRO-QA-052, *Issues Management*
CPCC-PRO-WKM-12115, *Work Management*
FM Global Loss Prevention Data Sheet 10-3, *Hot Work Management*

Appendix A - Qualifications

Only qualified personnel shall be permitted to conduct hot work operations. In the case of contractor/vendor personnel, the contractor/vendor designated manager shall review this procedure and offer evidence of qualifications at least as effective as those that follow, prior to conducting work at the site. The CPCCo Construction Manager shall be responsible for coordinating contractor/vendor hot work qualifications and shall transfer evidence to the cognizant FPE prior to contractor/vendor personnel being allowed on the premises.

a. Hot Work Operator. A worker shall be considered qualified for the purposes of this procedure to conduct hot work operations when they can demonstrate through training, education, or observation by a knowledgeable supervisor at least the following:

- Familiarity with the equipment to be used.
- Ability to inspect and evaluate the safe arrangement of the equipment, in accordance with the manufacturer's instructions.
- Knowledge of the correct position and proper use of equipment safeguards and safety interlocks.
- General knowledge of potential personnel, personal, and facilities hazards associated with the equipment; based upon a JHA.
- Knowledge of general safety principles in the arrangement of hot work area precautions, physical barriers, and personnel control.
- Ability to safely employ all required PPE.
- Understanding of and the ability to work within the Field Hot Work Permit process.
- Basic first aid.
- Use and restrictions of portable fire extinguishing equipment (in addition to the fire extinguisher awareness education provided by this procedure and Hanford General Employee Training/CPCCo General Employee Training (HGET/CGET), individuals assigned this task shall receive physical training in the selection and use of fire extinguishers in an established training course acceptable to the HFM).

- Importance of and effective implementation of fire watch.

b. Fire Watch. This position must be filled by an individual familiar with the arrangement, hazards, and protective features of the facility or area in which hot work is to be completed. A worker will be considered qualified to perform this function when they can demonstrate through training, education, or observation by a knowledgeable supervisor at least the following:

- Successful completion of General Employee Awareness Orientation and Training.
- Satisfactory foreperson evaluation of performance and general area knowledge after at least 3 months in the current job assignment.

- Successful completion of the basic and refresher updates (as appropriate) within one year of the proposed hot work for fire watch. This training shall include knowledge and effective implementation of the Field Hot Work Permit, safe hot work area evaluation, personnel protection, and fire prevention.
- Knowledge of general safety principles in the arrangement of hot work area precautions, physical barriers, and personnel control.
- Use and restrictions of portable fire extinguishing equipment (in addition to the fire extinguisher awareness education provided by this procedure and HGET/CGET, individuals assigned this task shall receive physical training in the selection and use of fire extinguishers in an established training course acceptable to the HFM).
- The fire watch shall clearly understand the following when performing fire watch duties:
  - The area to be fire watched
  - Potential fire hazards (to personnel and property)
  - Appropriate emergency procedures and actions
  - Methods for sounding alarm(s)
  - Procedure for manually activating fire suppression systems (if applicable)
  - That he/she has the authority to stop the hot work operations if unsafe conditions develop

c. Field Work Supervisor (FWS). This individual shall have the identical knowledge as the hot work performer, with particular emphasis on at least the following:

- Familiarity with the equipment to be used.
- Ability to inspect and evaluate the safe arrangement of the equipment, in accordance with the manufacturer's instructions.
- Knowledge of the correct position and proper use of equipment safeguards and safety interlocks.
- General knowledge of potential personnel, personal, and facilities hazards associated with the equipment; based upon a JHA.
- Knowledge of general safety principles in the arrangement of hot work area precautions, physical barriers, and personnel control.
- Understanding of and the ability to work within the Field Hot Work Permit process.
- Successful completion of General Employee Awareness Orientation and Training.
- General area knowledge of the proposed hot work area and associated equipment.
- Successful completion of the basic and refresher updates (as appropriate) within 1 year of the proposed hot work for fire watch. This training shall include knowledge and effective implementation of the Field Hot Work Permit, safe hot work area evaluation, personnel protection, and fire prevention.

d. Permit Authorizing Individual (PAI). This individual shall be familiar with the arrangement, hazards, and protective features of the facility or area in which hot work is to be completed, as well as an awareness of the operations or other work being performed in and around the hot work area. A worker will be considered qualified to perform this function when they can demonstrate through training, education, or observation by a knowledgeable supervisor at least the following:

- Successful completion of General Employee Awareness Orientation and Training.
- Demonstrated general knowledge of subject facility operations and the facility-specific organization for notifying the PAI of work package activities and operations being conducted on a daily basis.
- A knowledge of potential work activities or operations that may pose or be exposed by hot work activities and appropriate actions to be taken to minimize these conflicts.

e. Fire Monitor Following the completion of the established fire watch time period, fire monitoring shall be provided within the hot work area for up to an additional 3 hours as determined by the DFM/PAI.